FOOD GRINDER

Related Application:

This is a continuation-in-part application of pending application Ser. No. 08/962, 824, entitled "Cutting Assembly For Food Grinding Machines", filed on November 3, 1997 by M. Quadrana, NOW ABANDONED.

Field Of The Invention:

The present invention relates to a cutting assembly food grinding machines.

Background Of The Invention:

Conventional grinding machines used in the alimentary field are essentially constituted by a screw feeder, which is inserted in a specifically provided cylindrical seat arranged downstream of an inlet, is turned by a specifically provided motor and conveys the food towards a plurality of blades which rotate coaxially thereto, are fitted on the same driving shaft as the screw feeder, are grouped in a pack and are alternated with perforated screening diaphragms.

The diaphragms are arranged in a gradually decreasing sequence as regards both the density of the holes that affect each diaphragm and the diameter of the holes, so as to gradually provide, as the food advances outwards, a progressively finer reduction of the particle size of the mass.

However, especially in the processing of very dense food or of food having a fleshy pulp, the resistance that occurs when the mass passes between the diaphragms generates a very intense pressure, which is transmitted and distributed to said diaphragms, to the rotating blades and to the screw feeder.

Accordingly, this entails, especially in the industrial use of grinding machines, the use of motors with a high power rating, even as high as 70 HP, in order to overcome the resistance opposed by the mass being processed.

As a further consequence, there is provided a gradual deterioration not only of the sharpness of the blades but also of their structure, which by wearing very quickly require their replacement on the average every 4-5 working hours in addition to releasing microscopic fragments into the food.

Another problem of the known art in this field is the fact that in the diaphragms, the perforations that allow passage through them are distributed on each diaphragm with a decreasing density with respect to their surfaces, and this worsens the problem of the pressure applied by the food mass.

Summary Of The Invention:

The principal aim of the present invention is to solve the above problems of the known art by providing an improved cutting assembly for food grinding machines which substantially reduces the pressure produced during processing,

eliminates the possibility of releasing structural particles into the food and maintains a constant density of the distribution of the holes as the screening capacity gradually becomes finer.

This aim, these objects and others are achieved by an improved cutting assembly for food grinding machines, characterized in that it comprises a static outer jacket provided with conventional means for coupling to the loading inlet of a grinding machine, annular recesses being formed in the internal thickness of said jacket, said recesses having preset volumes and being mutually separated, a food pushed element being mounted inside said jacket so that it rotates coaxially, a screening means with differentiated passage regions being interposed between said pusher and said jacket, each region acting at said annular recesses.

Brief Description Of The Drawings:

Further characteristics and advantages will become apparent from the description of a preferred embodiment of a cutting assembly for food grinding machines, illustrated only by way of non-limitative example in the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view of a first embodiment of the present invention showing the essentials of the cutter assembly;

Figure 2 is a transverse sectional view, taken along the plane II-II of Figure 1;

Figure 3 is a sectional view of a second embodiment of the present invention showing the essentials of the cutter assembly;

Figure 4 is a transverse sectional view, taken along the plane IV-IV of Figure 3;

Figure 5 is a perspective, exploded view of a cutter element and screening means according to the embodiment of the cutter assembly of Figure 1; and

Figure 6 is a perspective, exploded view of a cutter element and screening means according to the embodiment of the cutter assembly of Figure 3.

Detailed Description Of The Invention:

With particular reference to the above Figures, the reference numeral 1 generally designates the cutting assembly for food grinding machines, which comprises a static outer jacket 2 provided with conventional means 3 for coupling to a loading inlet of a grinding machine, which is not illustrated since it is of a conventional kind.

A plurality of annular recesses 4 is formed in the internal thickness of the jacket 2; the recesses have preset volumes and are mutually separated.

A food cutter and pusher element 5 is mounted inside the jacket 2 so as to rotate coaxially and is supported in the grinding machine through conventional means which are adapted to keep it constantly centered; a screening means 6 is interposed between the cutter and pusher element 5 and the jacket 2 and is divided into differentiated passage regions Z_1, Z_2, Z_3 and Z_4, each of which can be crossed at each annular recess 4.

All of the recesses have a transverse cross-section with rounded edges which are blended with the concurrent ones by means of a respective convex profile 7, so as to define a forced path for the food, on which the screening means 6 rests and is locked.

The cutter and pusher element 5 is constituted, as shown in Figures 2 and 4 and 5-6, respectively, in detail by screw feeder blade elements 8 separated by annular ridges 8e. The helical edges 8a of the blades extend between two consecutive ridges 8e, are advantageously sharp and rotate so as to skim the internal surface of the screening means 6.

Each one of the blade elements 8 is preferably fabricated as a separate piece, as shown in Figure 5, by known methods. Such separate elements are eventually jointed to each other, at the ridges 8e, so as to obtain the cutter element 5, shown in Figure 1. The number of blades may be any according to the dimensions of the

machine. In the embodiments of the Figures, 7 and respectively 8, equidistant blades are shown.

The screening means is constituted by a thin cylindrical body 9, the surface of which is affected by contiguous bands of sets of through holes 10, separated by collars with slots of suitable shapes 11, which constitute the differentiated passage regions Z_1, Z_2, Z_3, Z_4 in which the ratio between the continuous surface and the perforated surface is constant throughout.

In a possible alternative embodiment, the static outer jacket 2 can flare outwards, as shown in Figure 3. Accordingly, the screw feeder blade elements 8 see Figure 6) also have suitably increasing cross-sectional dimensions, corresponding to the jacket flaring, and so does the interposed cylindrical body 9 that constitutes the screening means 6, which in this case is constituted by the coaxial and sequential joining of a plurality of cylinders 9a, 9b, 9c, 9d whose diameters gradually increase outwards; each cylinder defines one of the regions Z_1, Z_2, Z_3, Z_4, and the cylinders are mutually joined by means of corresponding perforated collars with slots 11.

In this case, too, each one of the cylinders 9a, 9b, 9c, 9d has lateral surfaces affected by the corresponding sets of through holes 10 whose diameters decrease

for each cylinder, so that the ratio between the perforated surface and the continuous surface is constant for each cylinder.

In order to better facilitate the advancement of the mass of processed food, the axis A' of the holes 10 is directed towards the outlet.

The operation of the present invention can be easily deduced from the above description: the food to be ground is introduced normally in the grinding machine through a hopper and passes from there into the seat in which the conventional screw feeder rotates; the cutting assembly 1 is installed coaxially at the head of said screw feeder.

The food, after the action of said screw feeder, is pushed further by the screw feeding effect of the blade elements 8, which rotate with the helical edges 8a thereof skimming the cylindrical body 9, while the cutter element 5, on the whole, is kept centered therein with conventional means for supporting it on the machine; at the same time, the food is engaged and cut by said helical edges 8a, which are conveniently sharp.

The conveyance motion forces the food to pass through the various regions Z_1, Z_2, Z_3, Z_4, following the forced path defined between the annular recesses 4 and the grooves 8b which are alternated with the ridges 8e, as shown in Figure 1 by the arrows "A"; in following this path, the mass of food passes through the

holes 10, whose diameters gradually decrease along the path, thus providing a gradually finer shredding action.

It should also be noted that the number of the holes 10 for each region Z is such as to maintain a constant ratio between the continuous surfaces of the regions Z and the perforated ones, so as to considerably reduce the pressure applied by the mass of food in passing through them.

Moreover, since the cylindrical body 9 is static, tangential stress, and therefore also abrasion, between the helical edges 8a of the blade elements 8 and the cylindrical body 9, in which the regions Z are formed, are also eliminated, and the blades are always centered during rotation. Functional advantages stem also from the fact that the edges 8a of the blades of the embodiment of Figure 5, deviate each, before merging into a respective ridge 8e located upstream along the food processing path, to form at each region of a blade element 8 corresponding upon assembly with the collar area having the slots 11, a respective pocket 8c. Such pockets 8c facilitate receiving of the food processed in its passage from the annular recess 4 of the jacket 2 to the grooves 8b formed between the blades.

In the embodiment of Figure 6, the transfer of the food from an annular recess 4 opposed to the grooves of a blade element 8 to the grooves 8b of the subsequent blade element 8, is even more facilitated, and food agglomeration risks

are practically eliminated by virtue of the flaring configuration of the assembly. Indeed, the food path through a recess 4 and next grooves is almost straight, the slots 11 being arranged crosswise thereat.

The blade edges 8a have each, in this embodiment, a bevel located suitably at the end intended to skim over a corresponding slotted collar region 11.

It will be accordingly noted that a processing path with a smooth food transfer is provided which is formed, for both embodiments described, by recesses 4 of the jacket 2, through holes 10 of the screening means, free passage means constituted by the slotted collars 11, and grooves 8b of the cutter element 5. The screening means 6, as mentioned above, have, for each of the passage regions Z_1, Z_2, Z_3 and Z_4, irrespective of the hole diameters, a constant total holed surface.

It has thus been shown that the described invention achieves the intended aim and objects.

The present invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept.

All the details may also be replaced with other technically equivalent elements.

In the practical embodiment of the present invention, the materials used, as well as the shapes and the dimensions, may be any according to the requirements without thereby abandoning the scope of the protection of the appended claims.